

Section 8 Technical Reports

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.f, and the criteria and standards described in LUC Sections 4.2.2, 8.1 through 8.4, 8.11, 8.12, 14.10.D.3, 14.10.D.4, and 14.10.D.6 through 14.10.D.11.

The following technical reports are provided in this section:

Section 8.a Wetland Mitigation Plan and 8.b Wildlife Conservation Plan

Sections 8.a and 8.b summarize the report Addendum A to the Natural and Cultural Resources Assessment found in **Appendix A**. The report identifies possible natural resources within the Alternative 3 (Option C) Corridor and associated monitoring and mitigation measures to minimize or eliminate potential impacts. The natural resources presented in the report include:

- Open waters, wetlands, and riparian areas
- Terrestrial and aquatic animals and habitats
- Terrestrial and aquatic plant life
- Noxious weeds

Section 8.c – Natural Hazard Mitigation Plan

The Natural Hazard Mitigation Plan identifies geologic hazard areas within the Alternative 3 (Option C) Corridor and associated mitigation measures that could be implemented to minimize potential impacts. The geologic information is based on Larimer County GIS data downloaded in August 2016 from Larimer County's GIS Digital Database.

The Alternative 3 (Option C) Corridor is located outside of wildfire hazard areas based on Larimer County GIS data downloaded in August 2016 from Larimer County's GIS Digital Data.

Section 8.d – Traffic Impact Study

As discussed during the Pre-Application Conference with Larimer County Planning staff on May 26, 2016, the Traffic Impact Study includes a traffic narrative that identifies the short- and long-term impacts of vehicular traffic and associated mitigation measures to minimize potential impacts. The narrative was developed in consideration with area goals and transportation improvement plans outlined in the *Larimer County Transportation Master Plan*.

Section 8.e – Drainage and Erosion Control Report and Plan

As discussed during the Pre-Application Conference, the Drainage and Erosion Control Report and Plan includes a drainage narrative. This section presents the existing site drainage within the Alternative 3 (Option C) Corridor including drainage watersheds and general flow paths, construction water quality management, and post-construction stormwater runoff. Possible mitigation measures to minimize potential impacts are also included.

Section 8.f – Floodplain Hydraulic/Hydrologic Modeling Report

The Floodplain Hydraulic/Hydrologic Modeling Report shows that the Alternative 3 (Option C) Corridor does not cross any floodplains. The TWP will not alter floodplains.

Section 8.g – Groundwater Modeling Report

Information for this section was provided in the Application and does not need to be supplemented.

Section 8.h – Non-Subdivision Water Supply Inquiry (Not Required)

As discussed during the Pre-Application Conference, a Non-Subdivision Water Supply Inquiry is not required.

Section 8.i – Simulation of the Appearance of the Facility (Not Required)

As discussed during the Pre-Application Conference, a Simulation of the Appearance of the Facility is not required.

Section 8.j – Computer Modeled Electromagnetic Field Measurements (Not Required)

As discussed during the Pre-Application Conference, a Computer Modeled Electromagnetic Field Measurement is not required.

Section 8.k – Noise Analysis

The Noise Analysis presents anticipated noise impacts during construction and post-construction operations and associated mitigation measures that could be implemented to meet the most current Larimer County Noise Level Ordinance.

Section 8.l – Air Quality Impact and Mitigation Report

The Air Quality Impact and Mitigation Report identifies potential sources of air pollution during construction and post-construction operations and associated mitigation measures that could be implemented to minimize potential impacts.

Section 8 Technical Reports

8.a Wetland Mitigation Plan

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.a, and the criteria and standards described in LUC Sections 8.2, 14.10.D.3, 14.10.D.4, 14.10.D.10, and 14.10.D.11.

The Alternative 3 (Option C) Corridor and study buffer cross multiple open waters, riparian areas, and wetlands. Additional information can be found in **Appendix A**, Addendum A to the Natural and Cultural Resources Assessment.

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Section 8 Technical Reports

8.b Wildlife Conservation Plan

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.b, and the criteria and standards described in LUC Sections 8.4, 14.10.D.3, 14.10.D.4, 14.10.D.10, and 14.10.D.11.

The Alternative 3 (Option C) Corridor and study buffer cross multiple wildlife habitats. Additional information can be found in **Appendix A**, Addendum A to the Natural and Cultural Resources Assessment.

Section 8 Technical Reports

8.c Natural Hazard Mitigation Plan

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.c, and the criteria and standards described in LUC Sections 8.3, 14.10.D.3, 14.10.D.4, 14.10.D.6, 14.10.D.7, and 14.10.D.11.

Based on Larimer County GIS data downloaded in December 2018 from Larimer County's GIS Digital Data and shown in **Figure 8.c-1S**, the Alternative 3 (Option C) Corridor is located outside of designated wildfire hazard areas. With the exception of the source water pump station, the majority of the TWP is underground including the water pipeline and underground appurtenances that would not be susceptible to wildfires.

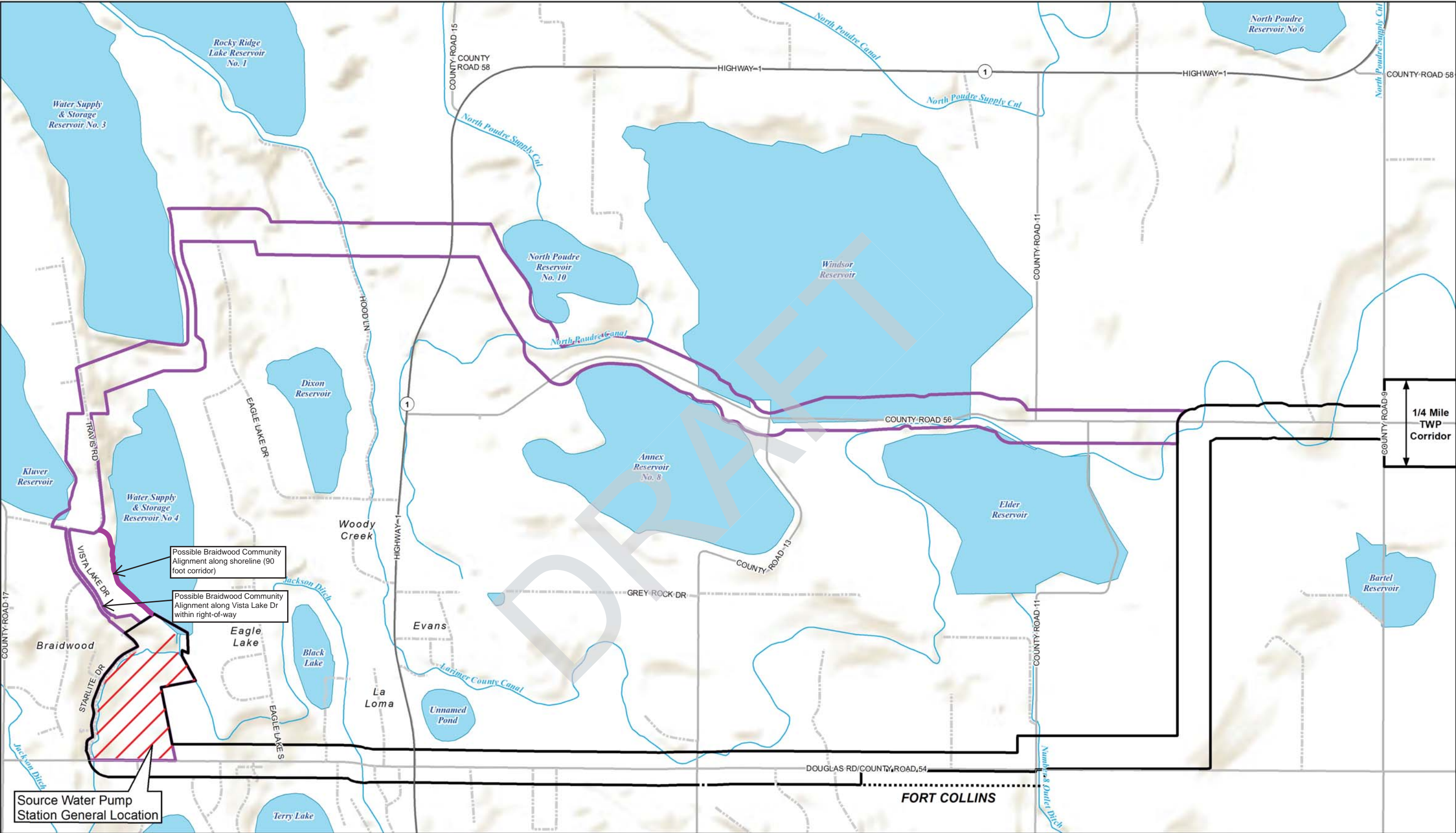
Based on Larimer County GIS data downloaded December 2018 from Larimer County's GIS Digital Data and shown in **Figure 8.c-2S**, the Alternative 3 (Option C) Corridor is located in a low geologic hazard category.

A subsurface geotechnical investigation of geologic conditions utilizing soil borings will be completed during design to further determine the subsurface soil conditions and associated geological hazards along the Alternative 3 (Option C) Corridor. Mitigation measures will be further refined during design to meet site-specific geological hazards.

If geologic hazards are found during the subsurface geotechnical investigation, mitigation measures may include, but are not limited to, the following:

- Stream and bank stabilization methods such as riprap protection or concrete mats
- Imported backfill material such as low-strength concrete
- Revegetation
- Soil erosion blankets during construction
- Trenchless construction methods
- Locating the final alignment outside of the geohazard area if possible, but still within the Alternative 3 (Option C) Corridor

Jurisdictional waters will be crossed using trenchless construction methods. Mitigation measures will be implemented as required in areas outside of any jurisdictional waters.





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0 500 1,000 Feet
1 inch = 1,400 feet

- Alternative 3 (Option C) Corridor
- TWP Corridor in Unincorporated Larimer County
- TWP Corridor outside Unincorporated Larimer County

- *Source Water Pump Station General Location
- Lake/Reservoir
- River/Stream/Canal/Ditch

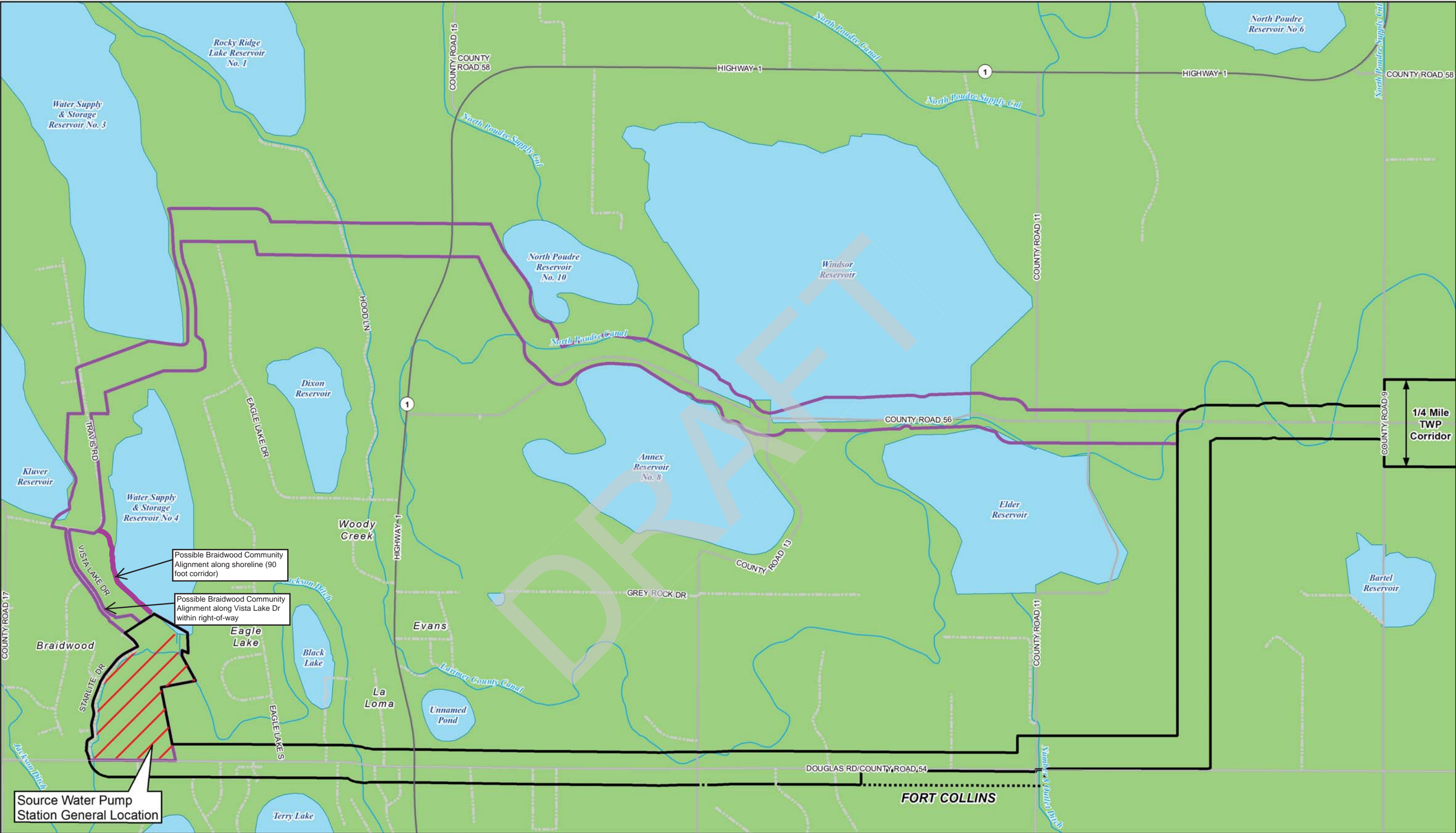
Wildfire Hazard Area


- Very High Hazard
- High Hazard
- Moderate Hazard
- Low Hazard
- Outside Hazard Mitigation Area

* Final location of the Source Water Pump Station will be determined during design development. Thornton will submit a Site Plan Review permit application to Larimer County after design has progressed to the level necessary to submit the application.

**Figure 8.c-1S
Alternative 3 (Option C) Corridor
Wildfire Hazards**

Sources: NHD, CDWR, Larimer County, CDOT, ESRI

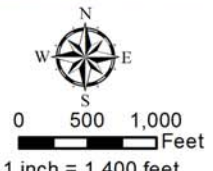




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- Alternative 3 (Option C) Corridor
- TWP Corridor in Unincorporated Larimer County
- TWP Corridor outside Unincorporated Larimer County

- *Source Water Pump Station General Location
- Lake/Reservoir
- River/Stream/Canal/Ditch

Geologic Hazard

- Severe (Class 5, 6, 7)
- Moderate (Class 3, 4)
- Low

* Final location of the Source Water Pump Station will be determined during design development. Thornton will submit a Site Plan Review permit application to Larimer County after design has progressed to the level necessary to submit the application.

**Figure 8.c-2S
Alternative 3 (Option C) Corridor
Geologic Hazards**

Section 8 Technical Reports

8.d Traffic Impact Study

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.d, and the criteria and standards described in LUC Sections 8.1, 14.10.D.6, 14.10.D.8, 14.10.D.9, and 14.10.D.11.

General Transportation Information

The Alternative 3 (Option C) Corridor is typically 500-feet wide for TWP components in unincorporated Larimer County. The final water pipeline alignment within a Larimer County approved corridor will be developed during final design. Typically a 50-foot permanent easement for the water pipeline and an additional 40-foot temporary easement for construction will be purchased from property owners except where the TWP will be constructed in road ROW. The Alternative 3 (Option C) Corridor width allows for flexibility when developing the final water pipeline alignment and location of appurtenances as described in Section 2: Project Description. The Alternative 3 (Option C) Corridor limits are shown on **Figure 8.d-1S**

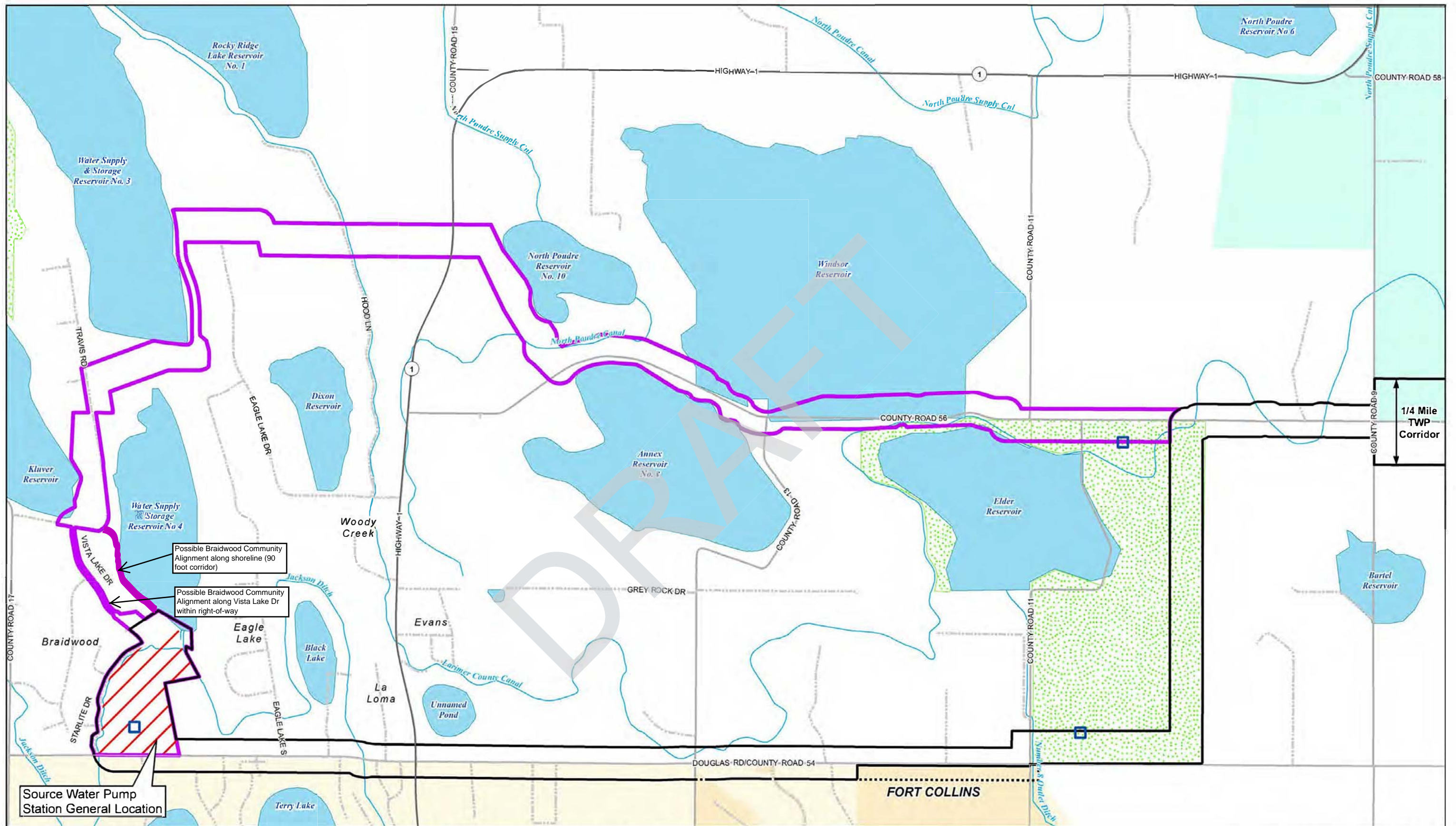
Thornton understands that, if the TWP is located parallel to and within the Larimer County ROW other than as specifically approved in a 1041 permit, then use of that ROW will require Larimer County approval.


The Alternative 3 (Option C) Corridor is approximately 6 miles long in unincorporated Larimer County north of Fort Collins. It includes an area that extends south from WSSC Reservoir No. 4 to the proposed location of the source water pump station. This area will accommodate the connection to WSSC Reservoir No. 4, the water pipeline to the source water pump station, and the water pipeline from the source water pump station. The Alternative 3 (Option C) Corridor extends north then east from the west side of WSSC Reservoir No. 4 to County Road 9. The Alternative 3 (Option C) Corridor shown on **Figure 8.d-1S** is less than 500-feet wide at some locations to minimize impacts to existing infrastructure. The Alternative 3 (Option C) Corridor generally follows roads and property lines.

The Alternative 3 (Option C) Corridor ties into the TWP corridor at County Road 9. The TWP with Alternative 3 (Option C) Corridor plus TWP corridor east of County Road 9) is approximately 27 miles long in unincorporated Larimer County.

The Alternative 3 (Option C) Corridor does not cross any municipal boundaries or established GMA.

Table 8.d-1S presents the multiple roads within the Alternative 3 (Option C) Corridor and the ADT of those roads. The basis for the ADT data was developed from the Traffic Section ADT asset layer from the *Larimer County Road Information Maps*, 2016-2018 data; and Colorado Department of Transportation (CDOT) Online Transportation Information System as applicable.






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<ul style="list-style-type: none"> Alternative 3 (Option C) Corridor TWP Corridor in Unincorporated Larimer County TWP Corridor outside Unincorporated Larimer County 	<ul style="list-style-type: none"> * Source Water Pump Station General Location Lake/Reservoir — River/Stream/Canal/Ditch Thornton Farm Potential Staging Area 	<table border="0"> <tr> <td>Corporate Boundary</td> <td>GMA Boundary</td> </tr> <tr> <td> Fort Collins</td> <td> Fort Collins</td> </tr> <tr> <td> Wellington</td> <td> Wellington</td> </tr> </table>	Corporate Boundary	GMA Boundary	 Fort Collins	 Fort Collins	 Wellington	 Wellington
Corporate Boundary	GMA Boundary							
 Fort Collins	 Fort Collins							
 Wellington	 Wellington							

Figure 8.d-1S
Alternative 3 (Option C) Corridor Map

* Final location of the Source Water Pump Station will be determined during design development. Thornton will submit a Site Plan Review permit application to Larimer County after design has progressed to the level necessary to submit the application.

Sources: NHD, CDWR, Larimer County, CDOT, ESRI

TABLE 8.d-1S
Roadway Classifications and ADT

Roadway	Limits	Classification	ADT	Impact
Douglas Road	Adjacent to source water pump station location	Minor Arterial (Road system: primary, mainline road, not a regional road, owned by Larimer County)	2,500-3,600	Is parallel to TWP corridor with Alternative 3 (Option C) Corridor
Starlite Drive	WSSC Reservoir No. 4 to Douglas Road	Not Applicable (Road system: non-chargeable, not a mainline road, not a regional road, owned by public/ general, gravel)	Not applicable	Is parallel to Alternative 3 (Option C) Corridor
Joey Road	Southwest of WSSC Reservoir No. 4	Not Applicable (Road system: non-chargeable, not a mainline road, not a regional road, owned by public/ general, gravel)	Not applicable	Is parallel to Alternative 3 (Option C) Corridor
Vista Lake Drive	Joey Road to Travis Road	Not Applicable (Road system: non-chargeable, not a mainline road, not a regional road, owned by public/ general, paved)	Not applicable	Is parallel to Alternative 3 (Option C) Corridor
Travis Road	Vista Lake Drive to northwest of WSSC Reservoir No. 4	Local (Road System: Secondary, mainline road, not a regional road, owned by Larimer County, paved)	190	Is parallel to and Intersects Alternative 3 (Option C) Corridor
Hood Lane	At the Larimer County Canal Crossing	Not Applicable, Private, gravel	Not Applicable	Intersects Alternative 3 (Option C) Corridor
State Highway 1	County Road 56	Minor Arterial/State Highway (Not maintained by Larimer County, not a mainline road, not a regional road, owned by CDOT)	5,600	Intersects Alternative 3 (Option C) Corridor
County Road 56	Highway 2 to County Road 9	Minor Collector (Road system: secondary, mainline road, not a regional road, owned by Larimer County)	95-120	Is parallel to TWP corridor
County Road 13	At County Road 56	Minor Collector (Road system: secondary, mainline road, not a regional road, owned by Larimer County, gravel)	55	Intersects Alternative 3 (Option C) Corridor
County Road 11 (north of County Road 56)	At County Road 56	Minor Collector (Road system: secondary, mainline road, not a regional road, owned by Larimer County, gravel)	75	Intersects Alternative 3 (Option C) Corridor

TABLE 8.d-1S
Roadway Classifications and ADT

Roadway	Limits	Classification	ADT	Impact
County Road 11 (south of County Road 56)	At County Road 56	Minor Collector (Road system: secondary, mainline road, not a regional road, owned by Larimer County, gravel)	80	Intersects Alternative 3 (Option C) Corridor
Fox Ridge Court	At County Road 56	Not Applicable (Road system: non- chargeable, not a mainline road, not a regional road, owned by public/ general, Bladed)	N/A	Intersects Alternative 3 (Option C) Corridor
Giddings Road (County Road 9)	At County Road 56	Major Collector (Road system: primary, mainline road, not a regional road, owned by Larimer County)	2,300-2,400	Intersects TWP corridor

Memorandum TWP – Summary of Existing Conditions and Project Impacts

In the fourth quarter of 2018, Larimer County recorded traffic volume data at intersections along County Road 56. That data is documented in the *Memorandum TWP – Summary of Existing Conditions and Project Impacts* by Felsburg Holt & Ullevig, November 13, 2018. Figure 2 from that memorandum shows the AM and PM peak hours of a typical weekday as shown in **Figure 8.d-2S**. The level of vehicle movements along County Road 56 are less than 10 vehicle peak hours. The analysis results presented in the memorandum indicate that construction impacts from Alternative 3 (Option C) Corridor will be almost undetectable because traffic volumes are extremely low and no improvements were recommended.

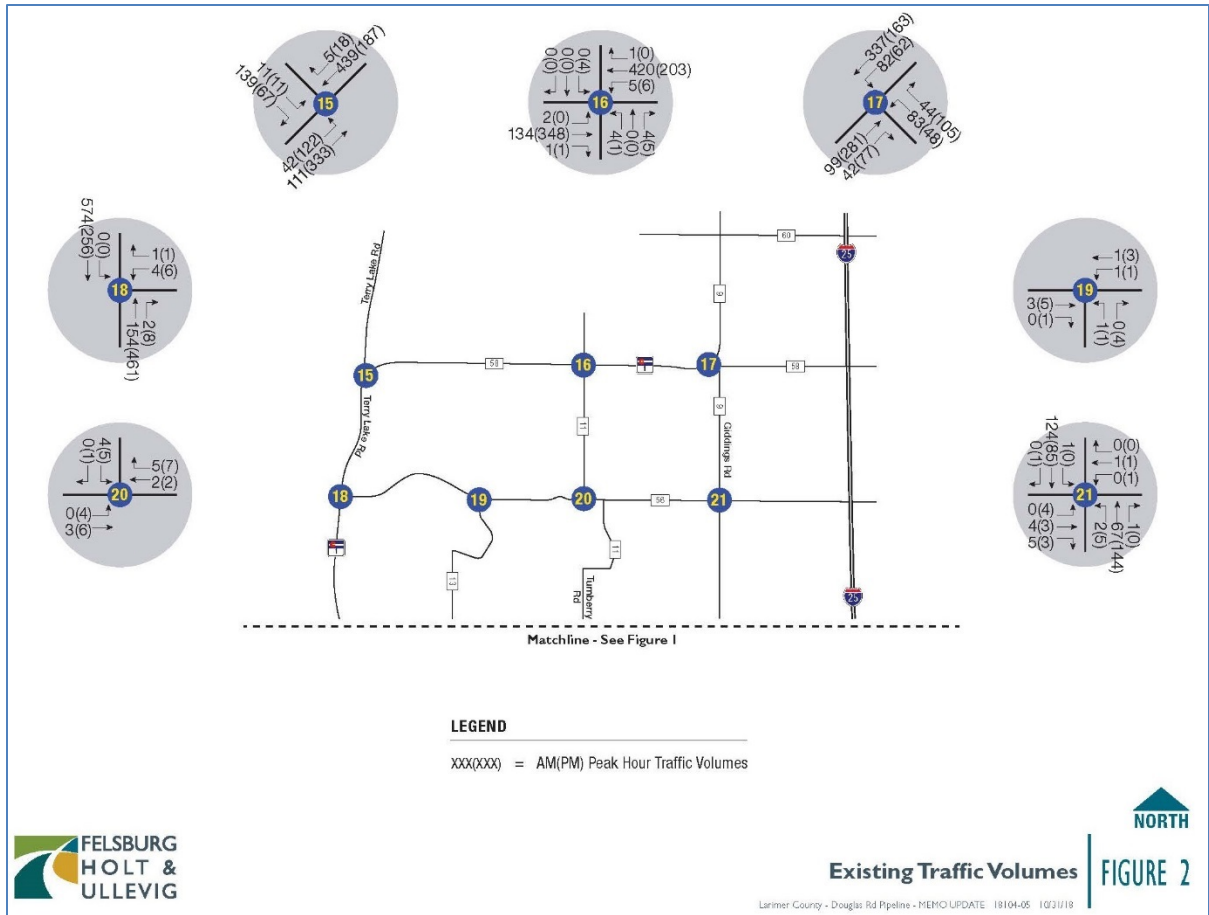


FIGURE 8.d-2S
 County Road 56 Existing Traffic Volumes

The Alternative 3 (Option C) Corridor does not cross any railroad.

Larimer County Transportation Master Plan

The Alternative 3 (Option C) Corridor was reviewed in conjunction with the area goals and transportation improvement plans outlined in the *Larimer County Transportation Master Plan*, adopted in July 2017. No planned improvements were identified along the Alternative 3 (Option C) Corridor for County Road 56. The *Larimer County Transportation Master Plan* includes planned improvements for Douglas Road near WSSC Reservoir No. 4. If Larimer County's improvement projects occur within the timeframe of the construction of the water pipeline and source water pump station near WSSC Reservoir No. 4, Thornton and/or the Alternative 3 (Option C) Corridor contractor will work with Larimer County and other involved parties to coordinate construction and minimize disruption.

Other Considerations

Traffic impacts due to construction and post-construction operation of the water pipeline and appurtenances have been considered. Thornton places a high priority on safety during construction. TWP contractors will implement traffic management plans based upon local traffic control requirements and general safe operating practices. Any areas impacted during construction will be restored to pre-construction conditions upon completion of the TWP. Traffic impacts after completion of the construction of the TWP are expected to be limited as the facilities will be unmanned and operations will require minimal traffic. Therefore, no level-of-service calculations or traffic modeling have been performed; however, the following elements are discussed in this section:

- Trip Generation
- Project Access
- Possible Delivery and Commuting Routes
- Material Storage
- Parking and Vehicle Storage
- Construction in ROW
- Permits

Trip Generation

During the construction phase of the TWP, trip generation will be primarily related to construction activities, including delivery of materials and equipment, worker transport, and water pipeline and appurtenances installation. Types of construction vehicles accessing the construction area will likely include those presented in **Table 8.d-2S**.

TABLE 8.d-2S
Anticipated Construction Vehicles

Construction Phase	Vehicle
Preparing the TWP Easements for Construction	Equipment Transport Truck
	Dump Truck
	Loader
	Trackhoe
	Motor Grader
	Crew Truck
	Service Truck

TABLE 8.d-2S
Anticipated Construction Vehicles

Construction Phase	Vehicle
	Inspection Vehicle
Pipeline Trenching and Installation	Pipe/Material Hauling Truck Equipment Transport Truck Pipe Installation Crew Truck Inspection Truck Concrete Truck Trackhoe Loader Dump Truck Welding Truck Water Truck
Backfilling	Equipment Transport Truck Dump Truck Loader Trackhoe Crew Truck Inspection Truck Concrete Truck Water Truck Compaction Equipment
Re-grading/Reseeding	Equipment Transport Truck Motor Grader Reclamation Vehicle Crew Truck Inspection Vehicle Water Truck

Construction activities within the Alternative 3 (Option C) Corridor are proposed to begin in 2020, and are expected to last up to approximately 2 years with operation of the TWP scheduled to begin in 2025. Construction of a water pipeline construction package, trenchless water pipeline package, and source water pump station may occur concurrently along the Alternative 3 (Option C) Corridor. Depending on the size and scope of individual construction packages, the timeframe to complete construction of a package could be multiple years. Construction of each water pipeline mile is expected to last between 4 and 10 weeks not including revegetation or ROW restoration activities.

Trip generation will vary according to the phase and location of construction. On average, five to ten trips per day to the site are expected for each type of vehicle: pickup trucks, welding trucks, pipe/material hauling trucks, water trucks, and equipment transport trucks for each construction package. Construction work hours will typically be from 7 a.m. to 7 p.m. Monday through Saturday unless otherwise approved by Larimer County. Construction may extend beyond these hours on an

as-required and case-by-case basis. For example, some construction activities, such as hydrostatic testing, require 24/7 operation, and shift work may be required.

Construction of a water pipeline construction package, trenchless water pipeline package, and source water pump station may occur concurrently with multiple crews of 10 to 55 workers each within the Alternative 3 (Option C) Corridor. At the peak of construction approximately 50 workers total could be required at various sites along the Alternative 3 (Option C) Corridor.

Post-construction trip generation will be primarily related to the operation and maintenance of the TWP. Normal operations and maintenance activities could include TWP operators periodically traveling in a pickup truck to the source water pump station location, and along the water pipeline route for a visual inspection. To the extent practicable, visual inspections could be from public roads to minimize impacts to property owners.

Project Access

Access along the final water pipeline alignment will be along roadways, at existing access locations when practicable, or via properties owned by Thornton that are within the construction work limits. New access locations are anticipated to be required for temporary and permanent use. Thornton will obtain individual Larimer County and CDOT access permits for any necessary temporary and permanent access locations as applicable. If access is needed using private roads or drives, Thornton will negotiate use with owners. Stabilized construction entrances/exits will be installed, as necessary, at the intersections of the TWP temporary access roads with paved roads. Permanent access locations will be designed per municipal standards based on location of access. Temporary access will be unpaved and used primarily for transport of materials and construction workers. Temporary and permanent access locations will be closed to the public. Temporary access locations could include warning signs, flaggers, and controlled access, as necessary. Additionally, gates or other approved barriers on temporary access roads may be utilized when construction workers are not present to control unauthorized access. Temporary access locations will be restored to pre-construction conditions upon the completion of construction.

It is anticipated that access to the final water pipeline alignment will be required along County Road 56. Other potential access locations, depending on the final water pipeline alignment, could be required along other local roads. It is anticipated that Travis Road will be required to provide access for construction vehicles during construction of the water pipeline, connection to WSSC Reservoir No. 4, and for future maintenance as necessary depending on the final water pipeline alignment. Vista Lake Drive or Starlite Drive could provide access for construction vehicles during construction of the water pipeline, connection to WSSC Reservoir No. 4, and for future maintenance as necessary. Vista Lake Drive and Starlite Drive are Larimer County public roads that are privately maintained. Vista Lake Drive is a paved road and Starlite Drive is a gravel road and, if used, Thornton will work with the community to ensure that roads are maintained during construction and restored to pre-construction or better condition after construction.

Access to the source water pump station will be determined after the final site location has been determined. Access to the source water pump station is anticipated to be from Douglas Road, but is dependent on the final location. Vista Lake Drive and Starlite Drive are Larimer County public roads that are privately maintained. Vista Lake Drive is a paved road and Starlite Drive is a gravel road and, if used, Thornton will work with the community to ensure that roads are maintained during construction and restored to pre-construction or better condition after construction. These existing roads could provide access for construction vehicles during construction of the source water pump station and for future maintenance as necessary. The access drive and parking areas are anticipated

to be gravel. Future access requirements will be minimal as this is anticipated to be an unmanned facility with limited maintenance requirements. Site access will be submitted for review to Larimer County with the Site Plan Review Permit application.

Possible Delivery and Commuting Routes

Truck haul routes for material deliveries from off-site locations will be chosen to facilitate safe and expedient delivery while minimizing traffic impacts. It is expected that the daily commuting route for construction workers would also follow the same roads as the truck haul routes to the construction site or temporary staging areas for parking. The major roads and highways within unincorporated Larimer County that could be utilized depending on the final water pipeline alignment and location of appurtenances for delivery of construction materials and construction worker trips as part of construction operations are presented in **Table 8.d-3S**.

TABLE 8.d-3S

Possible Delivery and Commuting Routes for Alternative 3 (Option C) Corridor

County or Major Roads	State Highways	Federal Highways
Giddings Road, Mountain Vista Drive, County Road 56, Douglas Road, Starlite Drive, Shields Street, Travis Road, Vista Lake Drive	State Highway 1	Interstate 25, Interstate 25 Northeast Frontage Road

Anticipated delivery and commuting routes are shown in **Figure 8.d-3S**. It is not expected that any road improvements or closures would be required to facilitate the transport of materials. In the event that a closure is necessary, the duration of the closure will be minimized, and Larimer County standards and procedures will be followed.

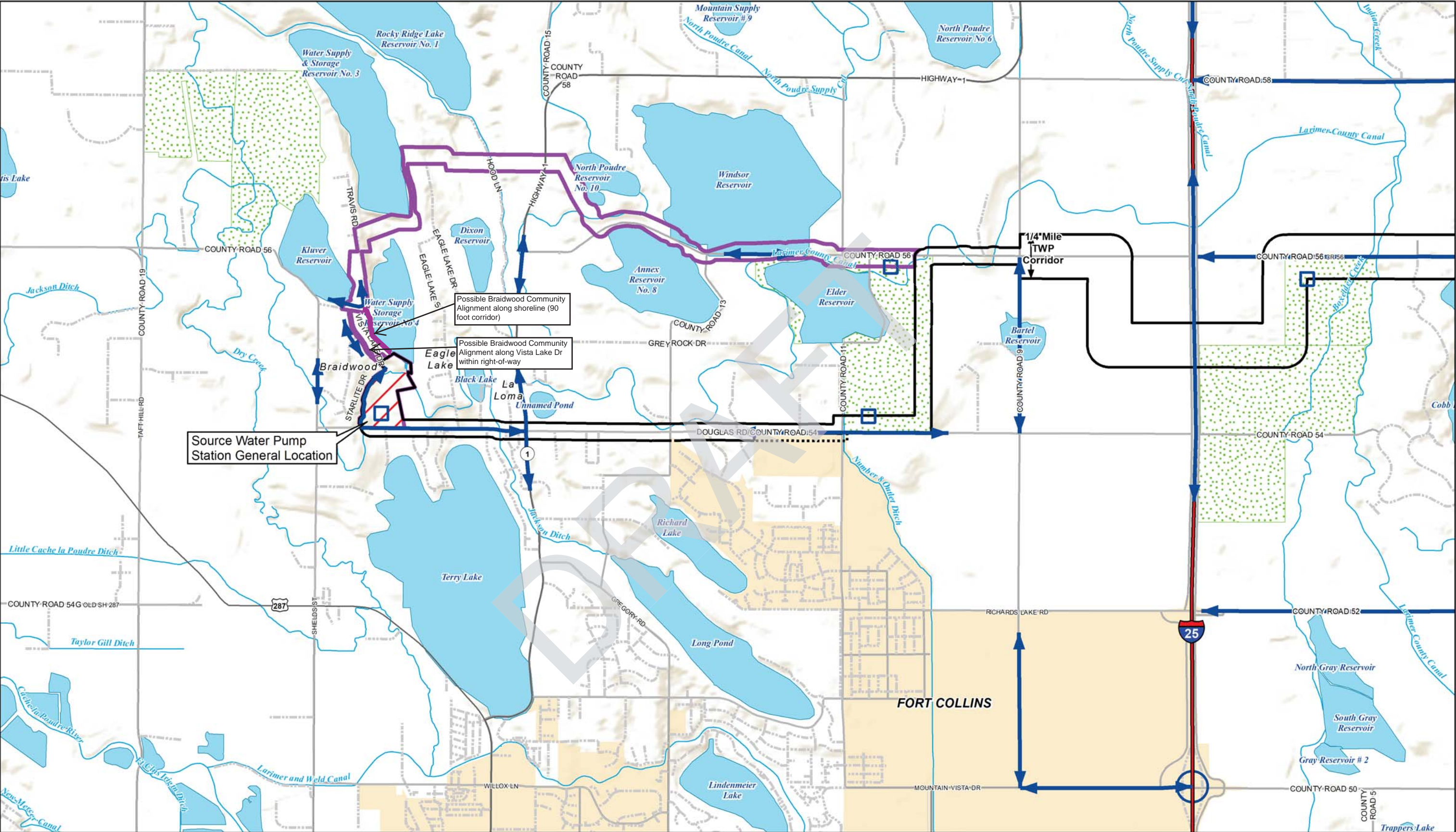
Material Storage


The water pipeline and other materials are expected to be transported via truck haul routes to the temporary and permanent easement or temporary staging areas. Preliminary anticipated staging locations within the Alternative 3 (Option C) Corridor are shown on **Figure 8.d-1S**. Additional information on staging areas is described in Application Section 2, Project Description. When possible, Thornton plans to off-load and string water pipeline along the easements as it is delivered to reduce the number of trips required for material delivery. Thornton will comply with Larimer County regulations regarding material storage, transport, and land use.

Parking and Vehicle Storage

Parking and vehicle storage during construction will be primarily on property within the permanent or temporary easement or at temporary staging areas. Thornton owns multiple properties in the area that can be utilized for parking and staging, and additional staging areas could be obtained. When additional parking is required, Thornton will negotiate with property owners and commercial businesses to provide additional parking to avoid parking in the public ROW. Temporary staging areas and worker buses or shuttles may also be implemented to reduce traffic when practicable. Construction workers will be instructed to abide by applicable laws and regulations both while commuting to and working at the TWP sites.

The source water pump station is anticipated to have an unpaved parking area on-site for use during regular maintenance activities. Post-construction maintenance and regular use is not expected to require extended vehicle parking or storage at either location.

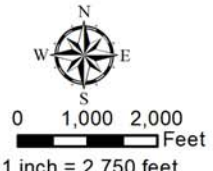




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- Alternative 3 (Option C) Corridor
- TWP Corridor in Unincorporated Larimer County
- TWP Corridor outside Unincorporated Larimer County
- *Source Water Pump Station General Location
- Lake/Reservoir
- River/Stream/Canal/Ditch
- Anticipated Major Haul Route
- Potential Staging Area
- Thornton Farm
- Interstate 25 Exit

* Final location of the Source Water Pump Station will be determined during design development. Thornton will submit a Site Plan Review permit application to Larimer County after design has progressed to the level necessary to submit the application.

**Figure 8.d-3S
Alternative 3 (Option C) Corridor
Possible Delivery and
Commuting Routes**

Construction in ROW

Road Crossings

Unless required otherwise by Larimer County, water pipeline road crossings including the appurtenant buried fiber optic cable in the Alternative 3 (Option C) Corridor will be constructed using open-cut construction. Road closures with detour routes or partial road closures could be required. Larimer County standards will be followed, and permits will be obtained for any required closures. ROW will be restored to pre-construction conditions and in accordance with Larimer County standards.

The TWP construction will utilize trenchless construction methods to cross Larimer County roads where required by Larimer County. Additional temporary construction easements could be required to accommodate trenchless construction methods. Where trenchless construction methods are used, shafts will be located on either side of the road for launching and receiving the water pipeline and the fiber optic cable. These shafts are expected to be located outside the ROW, if feasible. Equipment, pipe/materials, and temporarily stockpiled excavated material from the trenchless installation operation are expected to be stored on either side of the road. Larimer County standards will be followed, and permits will be obtained as required. Shafts will be backfilled and compacted, and affected areas will be restored to pre-construction conditions.

Pipeline Installation within ROW

Water pipeline installation within Larimer County ROW other than as specifically approved in a 1041 permit will require approval from Larimer County. At most locations the final water pipeline alignment within the Alternative 3 (Option C) Corridor is anticipated to parallel existing ROW and, if practicable, future road ROW. If property owners object to granting an easement for the Alternative 3 (Option C) Corridor parallel to County Road 56, the water pipeline is proposed to be located in the Larimer County ROW where feasible and as approved by Larimer County. Efforts to locate the TWP outside of environmentally sensitive areas or minimize disturbance to existing structures, such as homes, may require locating the water pipeline and fiber optic cable in Larimer County ROW for short distances. In areas where the water pipeline is located in the ROW, utilizing open-cut construction methods is anticipated.

Full or partial road closures will be required for TWP installation in Larimer County ROW. Thornton will coordinate with Larimer County on road closures and required permits will be obtained. Restoration requirements within ROW will be coordinated with Larimer County during design development. Larimer County standards will be followed and permits will be obtained for any required closures. ROW will be restored to pre-construction conditions and in accordance with Larimer County standards.

Permits

Required access permits from Larimer County will be obtained for access from any Larimer County road prior to start of construction in the Alternative 3 (Option C) Corridor. Access permit application(s) will be submitted to the Public Works Department (Engineering). The TWP will abide by the Larimer County Access Policy (*Urban Area Street Standards* or *Rural Area Road Standards*) as applicable. Larimer County ROW permits will be obtained for road crossings and to construct the TWP within Larimer County ROW. Requirements and stipulations of the permits will be followed.

As part of the permit applications mentioned above, Thornton and/or the TWP contractors will develop detailed traffic control plans that include adequate levels of service and safety measures for construction. Sample road closure types that may be implemented, as required, are shown in

Figure 8.d-3S. Access will be maintained to local area residents. Emergency vehicle access needs will be maintained and construction activities coordinated with local fire departments, police departments, ambulance services, and other emergency responders as necessary. **Figure 8.d-3S** sample road closures show closures that could be implemented at water pipeline road crossings to maintain access to local area residents and emergency responders. Water pipeline could be constructed with full road closure and construction of a temporary diversion or partial closures (with or within diversion) with pipeline construction occurring in one lane at a time.

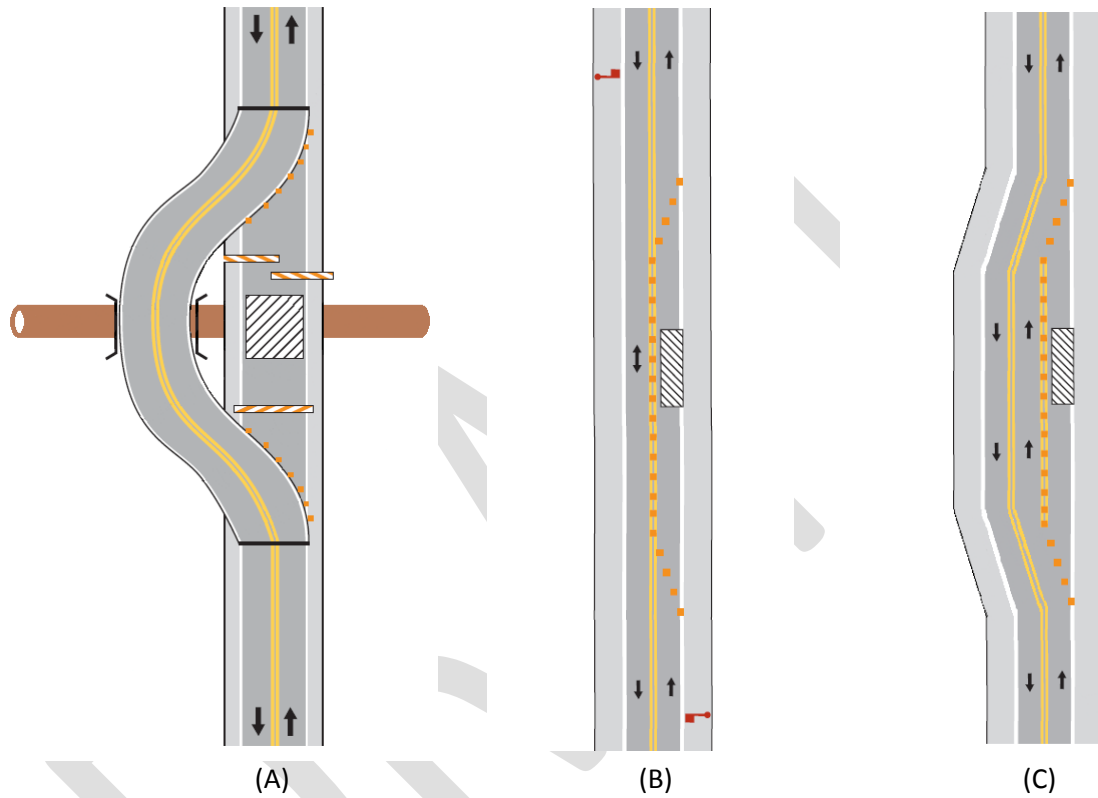


FIGURE 8.d-4S

(A) Road Closure with Diversion, (B) Partial Road Closure with Flaggers, (C) Road Closure with Diversion

Mitigation Measures

Thornton and/or the TWP contractors will implement traffic strategies to minimize or mitigate traffic disruption from construction activities that could include the following:

- To minimize impacts to public roads or bridges directly affected by the TWP, Thornton may provide maintenance as needed.
- To minimize conflicts between TWP traffic and local traffic, transport of materials could occur during off-peak hours when practicable. Movements of normal heavy trucks (not oversized) could also be minimized during peak hours to the extent possible. Delivery truck personnel and construction workers may be notified of potential height restrictions and overhead obstructions. Vehicles used for material transport will comply with *Larimer County Code of Ordinances Sec. 58-105* regarding the height, width, and length of vehicles, when practicable. If at any time vehicles of excess size or weight are required on Larimer County roads or bridges, permits will be obtained per the guidance of the *Larimer County Code of Ordinances*. Moving of any heavy

equipment across railroad lines will comply with *Larimer County Code of Ordinances Sec. 58-53*. Further detailed delivery routes and concerns will be addressed during the detailed design phase of the TWP, including verification that bridge crossings on the delivery route have adequate strength and capacity.

- Thornton will adhere to Larimer County limitations on road closures and construction during peak traffic hours, requirements regarding end-of-day conditions, and mandatory inspections. Whenever possible, the existing number of lanes will be maintained during construction. Temporary road closures or traffic control flaggers will be coordinated with Larimer County and local law enforcement. If speed limit reduction is required, such reduction will be in accordance with CDOT Form 586, *Authorization and Declaration of Temporary Speed Limits*. Traffic control measures such as traffic control flaggers, warning signs, lights, and/or barriers will be implemented to provide safety and efficient progression of traffic. Particular emphasis will be given to construction site access locations along Larimer County Road 1 near County Road 58 where there is a large amount of existing truck traffic in the area and possibly a reduced sight distance at the access location.
- To minimize the impacts of construction on the local community, Thornton will coordinate with Poudre School District regarding construction and haul routes and school bus traffic. However, the only buses operating along the Alternative 3 (Option C) Corridor are demand service responsive and are not anticipated to be adversely affected by the TWP construction.
- Construction within Larimer County ROW will conform to the *Larimer County Right-of-Way Permit Application and Construction Guidelines*.
- TWP contractors will use water trucks to control dust as necessary and will implement required dust control mitigation treatments. Post-construction, disturbed areas will be restored to their pre-construction condition and further dust control mitigation is not expected to be necessary.
- Stabilized construction entrances/exits will be installed, as necessary, at the intersections of the TWP temporary access roads with paved roads. Significant soil transferred onto paved roads will be removed as necessary to maintain the quality of county roads and state highways.
- Access will be maintained to local area residents. Emergency vehicle access needs will be maintained and construction activities coordinated with local fire departments, police departments, ambulance services, and other emergency responders as necessary.

Section 8 Technical Reports

8.e Drainage and Erosion Control Report and Plan

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.e, and the criteria and standards described in LUC Sections 8.1, 8.12, 14.10.D.3, 14.10.D.4, 14.10.D.6, 14.10.D.8, and 14.10.D.11.

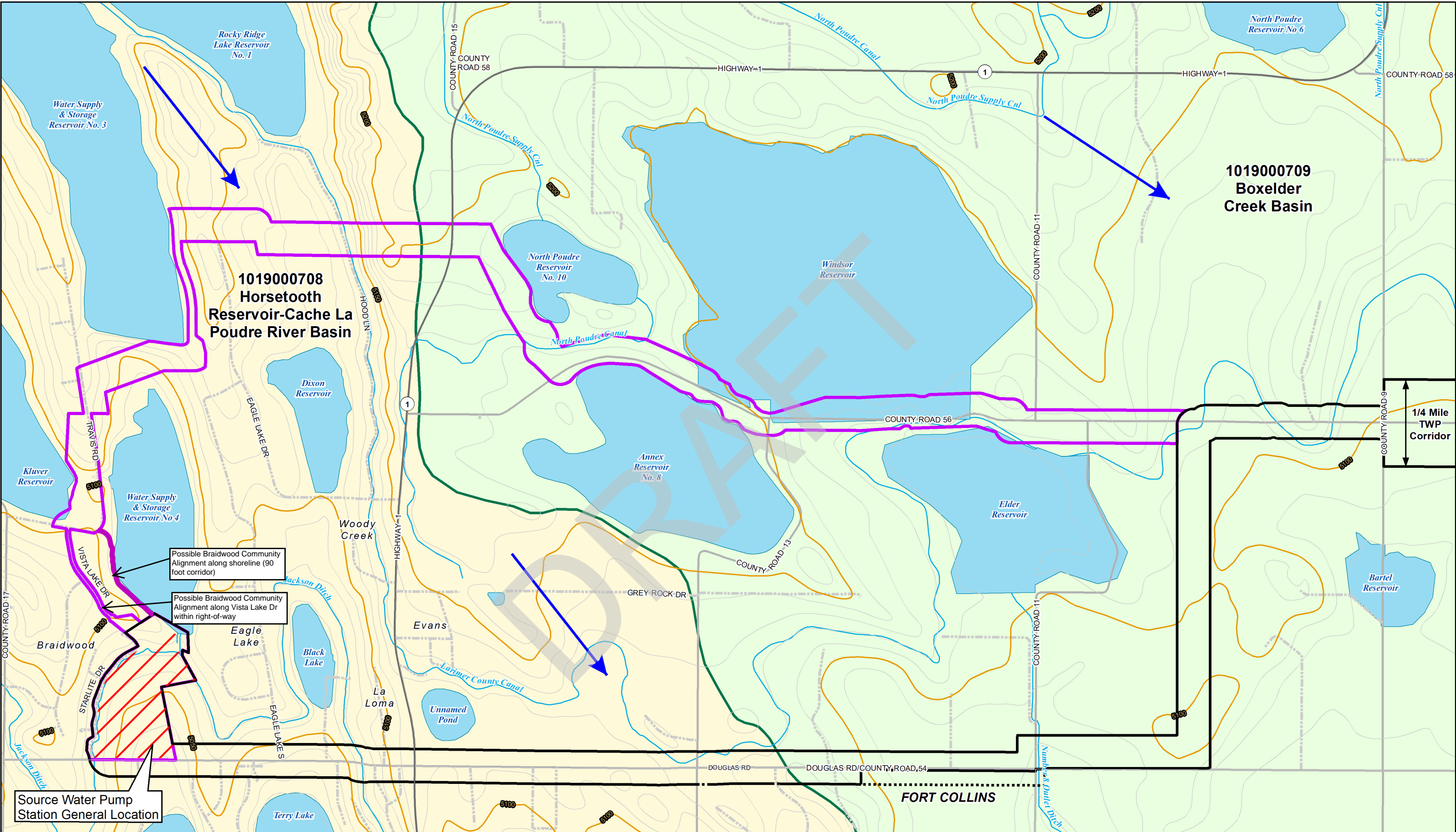
As discussed during the Pre-Application Conference with Larimer County Planning staff on May 26, 2016, submission of a simplified drainage narrative would be sufficient with the application because the majority of the TWP site will be restored to pre-construction conditions and the TWP does not include many impervious areas.


Corridor and Existing Site Drainage

The Alternative 3 (Option C) Corridor is typically 500-feet wide for TWP components in unincorporated Larimer County. The final water pipeline alignment within a Larimer County approved corridor will be developed during final design. Typically a 50-foot permanent easement for the water pipeline and an additional 40-foot temporary easement for construction will be purchased from property owners except where the TWP will be constructed in road ROW. The Alternative 3 (Option C) Corridor width allows for flexibility when developing the final water pipeline alignment and location of appurtenances as described in Section 2: Project Description. The Alternative 3 (Option C) Corridor spans two 10-digit hydrologic unit code (HUC) watersheds, as shown in **Figure 8.e-1S**, HUC Watersheds. A Site Plan Review that will include the required drainage and erosion control plan will be submitted to Larimer County after design has progressed for the source water pump station. This narrative focuses on the Alternative 3 (Option C) Corridor for the water pipeline and appurtenances.

The western-most portion of the Alternative 3 (Option C) Corridor near the connection to WSSC Reservoir No. 4 and west of State Highway 1 is located in the HUC 1019000708 watershed, the Horsetooth Reservoir-Cache la Poudre River Basin. Land in this portion of the Alternative 3 (Option C) Corridor generally drains from north to south. On average, topography slopes in this reach generally range from approximately 1 percent to approximately 8 percent. This portion of the Alternative 3 (Option C) Corridor crosses Jackson Ditch, WSSC Reservoir inlet/outlet ditches, Larimer County Ditch, and potentially other ditches, tributaries, and drainageways.

The majority of the eastern-most portion of the Alternative 3 (Option C) Corridor east of Highway 1 is located in the HUC 1019000709 watershed, the Boxelder Creek Basin. Topography in this portion of the Alternative 3 (Option C) Corridor generally drains from west to east. On average, topography slopes in this portion of the Alternative 3 (Option C) Corridor range from less than 1 percent to approximately 8 percent. This portion of the Alternative 3 (Option C) Corridor crosses North Poudre Canal, No. 8 Outlet Ditch, Larimer County Ditch, and potentially other ditches, tributaries, and drainageways.

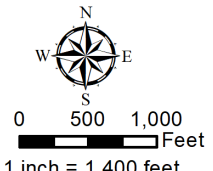




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0 500 1,000 Feet
1 inch = 1,400 feet

- Alternative 3 (Option C) Corridor
- TWP Corridor in Unincorporated Larimer County
- TWP Corridor outside Unincorporated Larimer County
- *Source Water Pump Station General Location
- Lake/Reservoir
- River/Stream/Canal/Ditch
- 100ft Contour
- 20ft Contour
- HUC 10 Boundary
- Boxelder Creek
- Horsetooth Reservoir - Cache La Poudre River
- Flow Direction

* Final location of the Source Water Pump Station will be determined during design development. Thornton will submit a Site Plan Review permit application to Larimer County after design has progressed to the level necessary to submit the application.

**Figure 8.e-1S
Alternative 3 (Option C) Corridor
Drainage and Erosion Control**

Sources: NHD, CDWR, Larimer County, CDOT, ESRI

Construction Water Quality Management

Development of the final alignment will consider water pipeline construction locations that minimize impacts to historical surface and subsurface water flows in the TWP area. Water pipeline crossings of jurisdictional waters, including wetlands, will be constructed utilizing trenchless construction methods.

Prior to construction, Thornton and/or the TWP contractors will obtain a Stormwater Discharge Associated with Construction Activity - General Permits from the Colorado Department of Public Health and Environment (CDPHE). Construction Stormwater Management Plan(s) (SWMPs) will be developed under the general permit to protect the quality of stormwater runoff during construction in accordance with the Construction Stormwater Discharge Permit requirements. The SWMP(s) will detail the potential pollutants to stormwater anticipated to be associated with construction, and the associated construction stormwater best management practices (BMPs) to be implemented to protect the quality of stormwater runoff from TWP areas during construction. The SWMP will describe the inspection and maintenance procedures implemented on the site to maintain erosion and sediment control practices. Site inspections will be conducted to meet the requirements and schedules stipulated under the permit.

Construction wastewater associated with the potential dewatering of trenches will be handled in accordance with CDPHE permit discharge requirements. Prior to construction, Thornton and/or the TWP contractors will obtain a General Permit for Construction Dewatering Activities from CDPHE and specify the management measures to capture and manage any generated discharge.

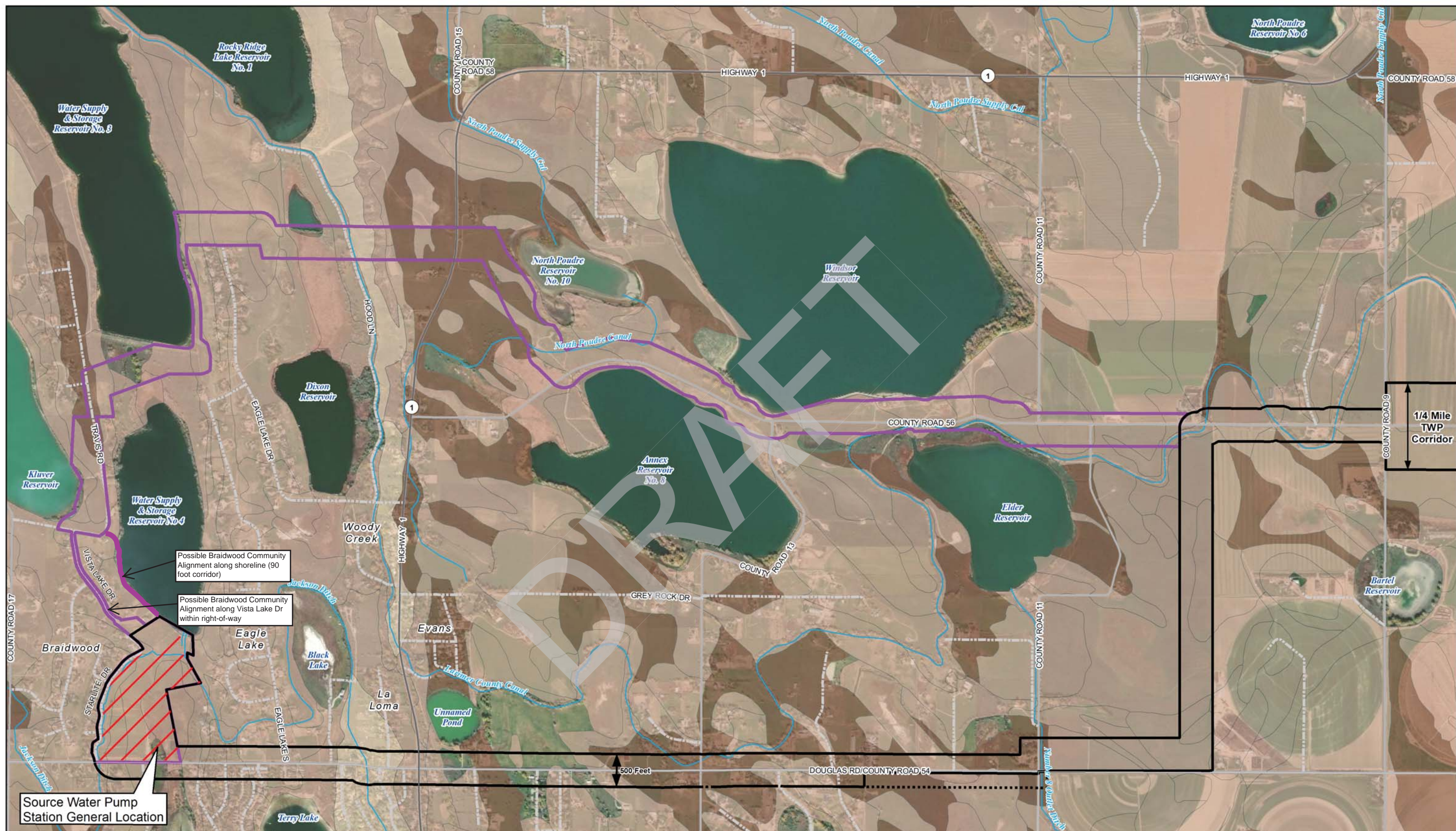
The TWP will be hydrostatically tested prior to operation start up. Before discharge of hydrostatic test water from the water pipeline, Thornton and/or the TWP contractor will obtain a General Permit for Discharges from Hydrostatic Testing of Pipelines, Tanks, and Similar Vessels from CDPHE. Sampling and effluent limits will be in accordance with permit requirements.


Construction BMPs

Appropriate criteria manuals and standards will be used for the development of the SWMPs and selection of BMPs. Manuals may include the *Urban Storm Drainage Criteria Manual (USDCM) Volume 3*, the *City of Greeley's BMPs for Utility Planning and Construction Through Rural, Wetland, and Riparian Lands*, and/or other state and local guidance documents. Example descriptions of common construction BMPs that could be used on the project are provided for reference in the **Application, Appendix D**.

BMPs will also be deployed for construction dewatering activities, pursuant to the Construction Stormwater Discharge Permit and/or the Construction Dewatering Discharge Permit as appropriate for the site conditions and soil erodibility, to protect the quality of stormwater, surface water, and groundwater in the TWP corridor. See Section 8. in this Supplement 3 for descriptions of groundwater protection practices that could be used during construction.

BMPs will be implemented under the SWMP to minimize or mitigate soil erosion and revegetate disturbed areas. Soil erodibility along the Alternative 3 (Option C) Corridor is shown in **Figure 8.e-25**. The soil erodibility figure shows the Natural Resources Conservation Service (NRCS) K factor values. K factor values represent the susceptibility of soil erosion, transportability of the sediment, and the amount and rate of runoff given a particular rainfall event. The majority of the Alternative 3 (Option C) Corridor is located within the medium soil erodibility range. A medium soil erodibility factor indicates that slight to moderate erosion is likely and that erosion-control measures may be needed.






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- Alternative 3 (Option C) Corridor
- TWP Corridor in Unincorporated Larimer County
- TWP Corridor outside Unincorporated Larimer County
- River/Stream/Canal/Ditch
- ★ Source Water Pump Station General Location

Soil Erodibility (K Factor)

- No Value
- Low (<0.20)
- Medium (0.20 - 0.40)
- High (>0.40)

* Final location of the Source Water Pump Station will be determined during design development. Thornton will submit a Site Plan Review permit application to Larimer County after design has progressed to the level necessary to submit the application.

Figure 8.e-2S
Alternative 3 (Option C) Corridor
Soil Erodibility Map

Sources: NHD, CDWR, Larimer County, CDOT, ESRI

A limited portion of the Alternative 3 (Option C) Corridor is located within the high soil erodibility range. High soil erodibility indicates that erosion is very likely and that erosion-control measures are advised, including revegetation of bare areas. Disturbed areas will be restored to pre-construction grades and revegetated at the conclusion of construction. Certified weed-free seed mix consisting of drought-tolerant native grasses will be specified in the SWMP for the revegetation of disturbed areas to meet property owner and regulatory requirements. Disturbed mature vegetation will be replaced, per a property owner's reasonable request, with a like species.

BMPs will be maintained and inspected. Failed BMPs will be replaced as required. After work is complete and final stabilization has been achieved, temporary BMPs will be removed. Final stabilization will be reached as defined in the Stormwater Discharge Associated with Construction Activity - General Permit.

Post-Construction Stormwater Runoff

The Alternative 3 (Option C) Corridor will be restored following construction to pre-construction grades and vegetation conditions with few exceptions. An example of an exception would be minor grading necessary following construction to restore a stable slope. In general, following TWP construction, the restored Alternative 3 Option C Corridor will drain in the same manner and at generally the same rate as it did prior to construction.

To mitigate impacts caused by erosion, landscaping for the TWP will consist of vegetation restoration and maintenance of areas disturbed by the TWP. Effects to vegetation along the easement areas will be temporary and mostly associated with construction. Potential future repairs and maintenance could affect discrete areas of vegetation so that the water pipeline and appurtenances may be accessed in a particular location. Any vegetated areas disturbed during maintenance or any required repairs will be restored by the methods used during construction.

Water pipeline crossings of jurisdictional waters, including wetlands, will be constructed using trenchless construction methods. Irrigation ditches will be crossed using trenchless construction methods as required by ditch owner. Existing ditches, streams, and natural drainages will be preserved and no permanent effects on area drainage are anticipated.

Within urbanized areas subject to National Pollutant Discharge Elimination System (NPDES) and Colorado Discharge Permit System (CDPS) municipal separate storm sewer system (MS4) regulations, project components will be designed to address post-construction stormwater in a manner that complies with applicable requirements of the local MS4, including *Larimer County Stormwater Design Standards*. The Alternative 3 (Option C) Corridor is not located within the boundaries of MS4 permitted areas in Larimer County.

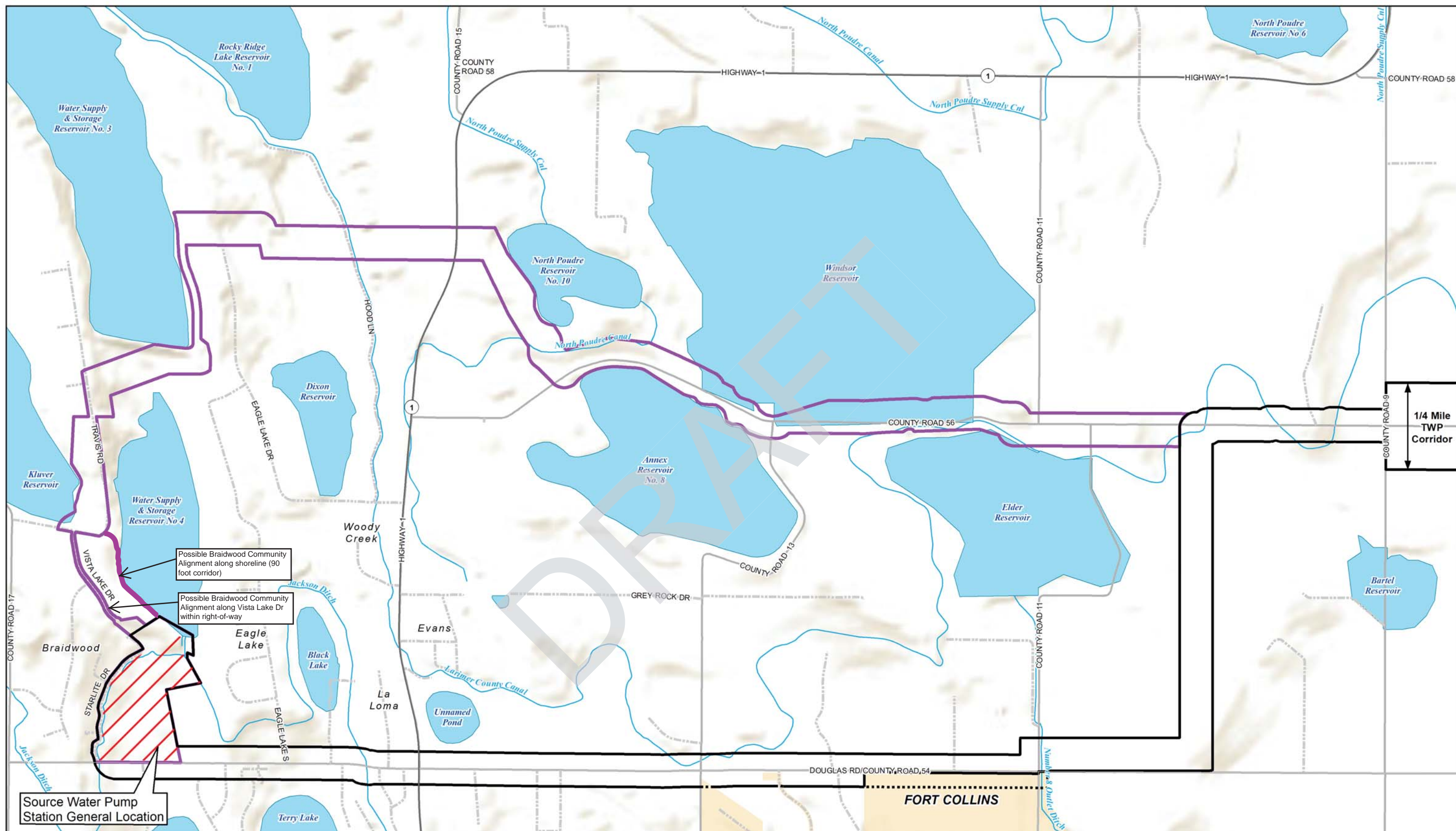
Section 8 Technical Reports


8.f Floodplain Hydraulic/Hydrologic Modeling Report

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.f, and the criteria and standards described in LUC Sections 4.2.2, 14.10.D.3, 14.10.D.4, 14.10.D.6, 14.10.D.7, and 14.10.D.11.

The Alternative 3 (Option C) Corridor does not cross any designated 100-year floodplain as shown on **Figure 8.fS**, 100-Year Floodplains.

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<ul style="list-style-type: none"> Alternative 3 (Option C) Corridor TWP Corridor in Unincorporated Larimer County TWP Corridor outside Unincorporated Larimer County 	<ul style="list-style-type: none"> / *Source Water Pump Station General Location Lake/Reservoir — River/Stream/Canal/Ditch 	<ul style="list-style-type: none"> 100-yr Flood Fringe 100-yr Floodway Outside Floodway
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* Final location of the Source Water Pump Station will be determined during design development. Thornton will submit a Site Plan Review permit application to Larimer County after design has progressed to the level necessary to submit the application.

Figure 8.fS
Alternative 3 (Option C) Corridor
100-yr Floodplain

Sources: NHD, CDWR, Larimer County, CDOT, ESRI

Section 8 Technical Reports

8.g Groundwater Modeling Report

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.g, and the criteria and standards described in LUC Sections 8.2, 8.12, 14.10.D.3, 14.10.D.4, and 14.10.D.11.

Information for this section was provided in the Application and does not need to be supplemented.

DRAFT

Section 8 Technical Reports

8.h Non-Subdivision Water Supply Inquiry

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.h, and the criteria and standards described in LUC Sections 8.1 and 14.10.D.8.

Information for this section was provided in the Application and does not need to be supplemented.

DRAFT

Section 8 Technical Reports

8.i Simulation of the Appearance of the Facility

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.i.

The Alternative 3 (Option C) Corridor appurtenances also include an approximate 40-million gallon per day (mgd) source water pump station located near WSSC Reservoir No. 4. The source water pump station will require an approximate 2-acre site with up to an approximate 10,000 square-foot building to house pumps and associated equipment.

The final siting of the source water pump station will be completed during final design. The preferred location is adjacent to Douglas Road. **Figure 8.iS** shows an example rendering of the source water pump station adjacent to Douglas Road. During design, Thornton will consider input and suggestions on the design and architecture for the source water pump station that reduce the visual impacts of the facility.



FIGURE 8.iS
Example Pump Station Rendering Adjacent to Douglas Road

Section 8 Technical Reports

8.j Computer Modeled Electromagnetic Field Measurements

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.j.

Information for this section was provided in the Application and does not need to be supplemented.

DRAFT

Section 8 Technical Reports

8.k Noise Analysis

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.k, and the criteria and standards described in LUC Sections 14.10.D.6 and 14.10.D.11.

The Application addressed how the TWP would comply with Larimer County's then-existing Noise Level Ordinance (currently Ordinance No. 97-03) during construction of the South 2 alternative selected as the preferred alternative and shown on **Figure 5.1.12.2-11** of **Application Appendix A, Technical Memorandum, Thornton Water Project, Larimer County Alternative Configurations Analysis – WSSC Reservoir Area to Larimer County Road 9**, October 2017 (Alternative Configurations Analysis). That same information is equally applicable to construction of the Alternative 3 (Option C) Corridor identified herein as the preferred alternative. Accordingly, that information is incorporated herein by reference.

No noises related to the water pipeline is anticipated.

Source Water Pump Station

Thornton heard community concerns that the diesel-powered backup generator associated with the source water pump station as proposed in the Application would be noisy and have emissions detrimental to nearby residents and the community as a whole. In response, Thornton was able to confirm with PVREA that it is possible for PVREA to extend a second, redundant power feed to the source water pump station for emergency backup power; therefore, an emergency diesel powered backup generator will not be required. Accordingly, Thornton proposes as a condition of approval, that it not place a permanent emergency diesel powered backup generator at the source water pump station site.

Section 8 Technical Reports

8.I Air Quality Impact and Mitigation Report

This section addresses *Larimer County Procedural Guide for 1041 Permits*, Item 8.I, and the criteria and standards described in LUC Sections 8.11, 14.10.D.3, 14.10.D.4, 14.10.D.6, and 14.10.D.11.

The Application addressed how Thornton and/or the TWP contractors would control fugitive dust emissions during construction of the South 2 alternative selected as the preferred alternative and shown on **Figure 5.1.12.2-11** of **Application Appendix A, Technical Memorandum, Thornton Water Project, Larimer County Alternative Configurations Analysis – WSSC Reservoir Area to Larimer County Road 9**, October 2017 (Alternative Configurations Analysis). That same information is equally applicable to construction of the Alternative 3 (Option C) Corridor identified herein as the preferred alternative. Accordingly, that information is incorporated herein by reference.

Thornton heard community concerns that the diesel-powered backup generator associated with the source water pump station as proposed in the Application would be noisy and have emissions detrimental to nearby residents and the community as a whole. In response, Thornton was able to confirm with PVREA that it is possible for PVREA to extend a second, redundant power feed to the source water pump station for emergency backup power; therefore, an emergency diesel powered backup generator will not be required. Accordingly, Thornton proposes as a condition of approval, that it not place a permanent emergency diesel powered backup generator at the source water pump station site.